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	Met Arg 125		y Gly	/ Asp	Glu	1 Leu 125		ı Ile	e Lei	ı Gly	/ Gln 1260	Lys)	a Asr	Ile
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20	<222>	(5433)(5435)								
25	<223>	Sequence of the 7967 bp Sau3AI genomic DNA fragment of ARD 11976 BAC 211 present in p211F-C12, Rpi-blb2 gene including natural egulatory elements necessary for correct expression of the gene The initiation codon (ATG position 1546-1548) and the terminate codon (TAG position 5433-5435)	₽.							
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55	· <223>	Sequence of S	949 bp Sau3	AI genomic	DNA fragmer	t of S. bulbo	castan
		hours the Rn	-blb2 gene	including n	atural elem	penomic fragmenents necessar	ry for
60		expression. nation codon	initiation (TAG positi	codon (ATG on 5300-530	position 14	13-1415), the	s cerut
	<220>						

<223> Sequence of 9949 bp Sau3AI genomic DNA fragment of S. bulbocastan um 2002 BAC BlbSP39 present in pSP39-20. The genomic fragment har bours the Rpi-blb2 gene including natural elements necessary for 5 expression. Iinitiation codon (ATG position 1413-1415), the termi nation codon (TAG position 5300-5303)

10 <220>

<221> stop_codon

<222> (5300)..(5303)

15

Sequence of 9949 bp Sau3AI genomic DNA fragment of S. bulbocastan <223> um 2002 BAC BlbSP39 present in pSP39-20. The genomic fragment har bours the Rpi-blb2 gene including natural elements necessary for expression. Iinitiation codon (ATG position 1413-1415), the termi

20 nation codon (TAG position 5300-5303)

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	1			3	5					10					15 ·		
	ttt Phe	tct Ser	gct Ala	ctt Leu	agc Ser	aag Lys	gac Asp	att Ile	gcc Ala	gat Asp	gtt Val	ctg Leu	gtt Val	ttc Phe	cta Leu	gag Glu	96
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50			35					40					45				
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10	cat His	gly aaa	ttg Leu	ata Ile	gtg Val 165	aat Asn	ggt Gly	tgc Cys	att Ile	aag Lys 170	cat His	gag Glu	atg Met	gtt Val	gag Glu 175	aat Ası	i n	528	
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40	ctg Leu	caa Glr	a gag n Glu 275	ı His	atg Met	gta Val	act Thr	gtt Val 280	. Ile	aco Thi	c cci	t ago o Sei	c act c Thi 28!	r Se	a ggg	y A	ct la	864	;
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50	atg Met 305	. Pr	c aaq o Ly	g gad s Asj	ttt Phe	att Ile 310	His	cat His	gao Asj	c aaa o Lya	a ct s Le 31	u Ph	t ga e As	t ct p Le	c tt u Le	u A	at sp 20	960).
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55	gaa Glu	a ga u Gl	g ga u Gl	a cca u Pro 34	o Ar	g aat g Ast	t aaa n Lys	a ga	g gg u Gl 34	y As	t aa n As	c ca n Gl	a ac n Th	a aa r As 35	n Cy	t g s A	ca la	105	6
60	ace Th	c ct r Le	a ga u As 35	p Le	g cto u Le	g ga u Gl	a aat u Asi	t at n Il 36	e Gl	a ct u Le	c ct u Le	c aa u Ly	g aa 's Ly 36	s As	t ct p Le	c a	iys .ys	110	4
65	Hi	s Va		r Le	u Ly	s Al	a Le [.] 37	u As 5	p Se	r Se	r Gl	ln Cy 38	rs Cy	ys Pi	ne Pi	co M	let	115	2
	ag Se	t ga r As	t gg p Gl	a co y Pr	a ct	c tt u Ph	c at e Me	g ca t Hi	t ct	t ct	a ca u H	ac at is II	a ca Le Hi	ac ti Ls Le	a aa au Aa	at g	gat Asp	120	0

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25			atc Ile														. 1488
			ggt Gly														1536 ,
50	aag Lys	tca Ser	ttg Leu 515	aca Thr	act Thr	gat Asp	aaa Lys	ata Ile 520	act Thr	gta Val	ggt Gly	ttt Phe	gag Glu 525	gag Glu	gaa Glu	aca Thr	1584
35	aac Asn	ttg Leu 530	ata Ile	ctt Leu	aga Arg	aag Lys	ctc Leu 535	acc Thr	agt Ser	gga Gly	tcg Ser	gca Ala 540	gat Asp	cta Leu	gat Asp	gtc Val	1632
40		Ser	atc Ile									Thr					1680
45	aaa Lys	gta Val	. tac . Tyr	aat Asn	gat Asp 565	Lys	tca Ser	gtt Val	tct Ser	ago Ser 570	Arg	ttc Phe	gac Asp	Leu	cgt Arg 575	gca Ala	1728
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55	gat Asp	gtt Val	L Ala	gat Asp	aaa Lys	tta Leu	cgg Arg 615	. Lys	caa Glr	a cto n Leu	g ttt ı Phe	gga Gly 620	/ Lys	agg Arg	g tat g Tyr	ctt Leu	1872
60	att Ile 625	va:	tta L Lev	gat Asp	gac Asp	gtg Val 630	Trp	gat Asp	act Thi	act Thi	aca Thi 635	r Trp	g gat o As <u>r</u>	gag Glu	g tta ı Lev	a aca ı Thr 640	1920
65						ı Ser					r Ar					a act r Thr	1968
	egg Arg	g gaa g Gli	a aag u Lys	g gaa Gļī	a gtg ı Val	g gct L Ala	tto Lei	g cat n His	gga Gl	a aaq y Ly	g cto	g aad u Asi	act n Thi	t gai	t cci p Pro	t ctt o Leu	2016

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10										ctt Leu							:	2160
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30										tit Phe								2352
										ggt Gly								2400
35										gtg Val 810								2448
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		Asp					Gln			att Ile		Cys				gag Glu 880		2640
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60					Lev					Ile					Leu	gat Asp		2736
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																ctg Leu		2832

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	caa gtt a Gln Val L	aa tat ctg co ys Tyr Leu Pi 965	ct ttg tct ro Leu Sei	t ttc tca r Phe Ser 970	Asn Leu Trp	aat cta gaa Asn Leu Glu 975	2928
10 .	agc ctg t Ser Leu P	tt gtg tct ac he Val Ser Tl 980	ec aac aga hr Asn Arg	a tca atc g Ser Ile 985	ttg gta cta Leu Val Leu	tta ccg aga Leu Pro Arg 990	2976
15	Ile Leu A	at ctt gta a sp Leu Val L 95	ag ttg cga ys Leu Arc 10	g Val Le	u Ser Val As	t get tgt tet p Ala Cys Ser 05	3024
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25	aca aag Thr Lys 1025	tta gag aac Leu Glu Asn	ttg aga Leu Arg 1030	ata tta a Ile Leu T	cg gaa ctg hr Glu Leu 1035	ttg att tcc Leu Ile Ser	3114
30		aaa gat aca Lys Asp Thr				ccc aat ctt Pro Asn Leu	3159
50	cag ttg Gln Leu 1055	ctt tca ttt Leu Ser Phe	gaa ctc Glu Leu 1060	aag gag t Lys Glu S	cca tgg gat Ser Trp Asp 1065	tat tca aca Tyr Ser Thr	3204
35	gag caa Glu Gln 1070	cat tgg ttc His Trp Phe	tcg gaa Ser Glu 1075	ttg gat t Leu Asp I	ttc cta act Phe Leu Thr 1080	gaa cta gaa Glu Leu Glu	3249
40	aca ctc Thr Leu 1085	tct gta ggt Ser Val Gly			aac aca aac Asn Thr Asn 1095		3294
45	tcc tct Ser Ser 1100	gta gcg aca Val Ala Thr	aat cgg Asn Arg 1105	ccg tgg g	gat ttt cac Asp Phe His 1110	ttc cct tca Phe Pro Ser	3339
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	tca cta Ser Leu 1130	Ser Thr Ile	gcg aga Ala Arg 1135	ctg ccc a	aac ctt gaa Asn Leu Glu 1140	gag ttg tcc Glu Leu Ser	3429
55		His Thr Ile		Gly Glu		atg ggg gag Met Gly Glu	3474
60	gaa gac Glu Asp 1160	Thr Phe Glu	aat ctc Asn Leu 1165	Lys Phe	ttg aac ttc Leu Asn Phe 1170	aat caa gtt Asn Gln Val	3519
65	agt att Ser Ile 1175	Ser Lys Trp	gag gtt Glu Val 1180	Gly Glu	gaa tcc ttc Glu Ser Phe 1185	ccc aat ctt Pro Asn Leu	3564
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50	Asn Glu Glu Asn Gln Lys 35	Ala Leu Asp Lys Asp 40	Gln Val Glu Lys Ile 45
	Lys Leu Lys Met Ala Phe 50	: Ile Cys Thr Tyr Val 55	Gln Leu Ser Cys Ser 60
55	Asp Phe Glu Gln Phe Glu 65 70	1 Asp Ile Met Thr Arg 75	Lys Arg Gln Glu Val 80
60	Glu Asn Leu Leu Gln Pro 85	Leu Leu Asp Asp Asp 90	Val Phe Thr Ser Leu 95

Thr Ser Asn Met Asp Asp Cys Ile Ser Leu Tyr His Arg Ser Tyr Lys 100 105 110 65

Ser Asp Ala Ile Met Met Asp Glu Gln Leu Asp Phe Leu Leu Asn

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			115					120				;	125			
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10	Thr (Gln	Tyr	Glu		Leu 150	Gln	Asn	Ile	Cys _.	Gly 155	Asn	Ile	Arg	Asp	Phe 160
	His	Gly	Leu	Ile	Val 165	Asn	Gly	Суз	Ile	Lys 170	His	Glu	Met	Val	Glu 175	Asn
15	Val	Xaa	Pro	Leu 180	Phe	Gln	Leu	Met	Ala 185	Asp	Arg	Val	Gly	His 190	Phe	Leu
20	Trp	Asp	Asp 195	Gln	Thr	qaA	Glu	Asp 200	Ser	Arg	Leu	Ser	Glu 205	Leu	Asp	Glu
25	Asp	Glu 210		Asn	Asp	Arg	Asp 215	Ser	Arg	Leu	Phe	Lys 220	Leu	Ala	His.	Leu
30	Leu 225	Leu	Lys	Ile	Val	Pro 230	Val	Glu	Leu	Glu	Val 235	Ile	His	Ile	Сўз	Tyr 240
	Thr	Asn	. Leu	r PÀs	Ala 245	Ser	Thr	Ser	· Ala	. Glu 250	ı Val	Gly	Leu	Phe	Ile 255	Lys
35	Gln	Lev	ı Lev	1 Glu 260		Ser	Pro	As <u>r</u>	265	e Lev	ı Arg	Glu	Tyr	Leu 270	. Ile	Pro
40	Leu	Glı	1 Glu 275		Met	. Val	. Thi	280	l Ile	e Thi	r Pro	Ser	Thr 285	Ser	Gly	Ala
45	Arg	Ası 29		e∙ His	val	. Met	: Me1		ı Phe	e Lei	u Lev	Let 300	ı Ile	e Leu	ı Ser	: Asp
50	Met 305		o Ly	s Ası	Phe	310		s Hi	s As	p Ly	s Leu 319	ı Phe	e Ası) Lev	ı Leı	1 Asp 320
	Arg	y Va	1 G1	y Va	l Let 325		r Ar	g Gl	u Va	1 Se 33	r Th	r Le	u Va	l Ar	33.	o Leu 5
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60	Th	r Le	eu As 35		u Le	u Gl	u As	n Il 36	.e Gl :0	u Le	eu Le	u Ly	s Ly 36	s As 5	p Le	u Lys
65	His	s Va 37		r Le	u Ly	s Al	а Le 37		sp Se	er Se	er Gl	n Cy 38	a Cy	s Ph	e Pr	o Met

Ser Asp Gly Pro Leu Phe Met His Leu Leu His Ile His Leu Asn Asp

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	Ala	Glu	Gln 435	Gly	Leu	Tyr	Lys	Asp 440	Leu	Trp	Ala		Val 445	Leu	Asp	Val
15		Tyr 450	Glu	Ala	ГÀЗ	Asp	Val 455	Ile	Asp	Ser	Ile	Ile 460	Val	Arg	Asp	Asn
20	Gly 465	Leu	Leu	His	Leu	Ile 470	Phe	Ser	Leu	Pro	Ile 475	Thr	Ile	ГЛЗ	ГЛЗ	Ile 480
25	Lys	Leu	Ile	Lys	Glu 485	Glu	Ile	Ser	Ala	Leu 490	Asp	Glu	Asn	Ile	Pro 495	Lys
30	Asp	Arg	Gly	Leu 500	Ile	Val	Val	Asn	Ser 505	Pro	Lys	Lys	Pro	Val 510	Glu	Arg
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40	Ile 545	Ser	Ile	Thr	Gly	Met 550		Gly	Ser	Gly	Lys 555	Thr	Thr	Leu	Ala	Tyr 560
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	Arg	g Gl	ı Lya	s Glı	ı Val	Ala	a Le	u His	s Gl	у Гу	s Lei	a Asr	n Th	r Asj	o Pr	o Leu

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10	_	Ala 690	Phe	Gly	Asn		Ser 695	Сув	Pro	Asp _.	Glu	Leu 700	Leu	Asp	Val	Gly
	Lys 705	Glu	Ile	Ala	Glu	Asn 710	Суз	Lys	Gly	Leu	Pro 715	Leu	Val	Ala	Asp	Leu 720
15	Ile	Ala	Gly	Val	Ile 725	Ala	Gly	Arg	Glu	Lys 730	ГЛа	Arg	Ser	Val	Trp 735	Leu
20	Glu	Val	Gln	Ser 740	Ser	Leu	Ser	Ser	Phe 745	Ile	Leu	Asn	Ser	Glu 750	Val	Glu
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	Thr 785		Туг	Glu	Leu	Asn 790	Val	Tyr	Phe	Gly	Ala 795	Glu	Gly	Phe	Val	Gly 800
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45	Ala	. Let	1 Ası 83!		Gln	. Ile	His	Asp 840		ı Val	. His	AS <u>I</u>	9 Phe 845		Lev	ı Ile
50	Lys	850		g Lys	g Glu	. Asn	Lev 855		e Ası	Glr	ı Ile	860	g Sei	r Sei	Ala	a Pro
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55	His	s Ph	e Gl	у Lei	ı Ası	n Phe	e Val	l Me	t Ph	e As	p Se:	r As:	n Ly	s Ly:	a Ar	g His

His Phe Gly Leu Asn Phe Val Met Phe Asp Ser Asn Lys Lys Arg His 885

Ser Gly Lys His Leu Tyr Ser Leu Arg Ile Ile Gly Asp Gln Leu Asp

900 905 910 . Asp Ser Val Ser Asp Ala Phe His Leu Arg His Leu Arg Leu Leu Arg

65

915

Val Leu Asp Leu His Thr Ser Phe Ile Met Val Lys Asp Ser Leu Leu

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	Ser L	eu 1	Phe	Val 980	Ser	Thi	As	an Arg	985		e Lev	ı Val	l Leu	Leu 990	Pro	Arg
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20	Phe P	he 010		o Me	t As	рA	la i	Asp (3lu :	Ser :	Ile 1	Leu	Ile 1020	Ala (3lu i	Asp
25		.ув 1025		u Gl	u As	n L	eu i	Arg 1030	Ile :	Leu '	Thr	Glu :	Leu 1035	Leu :	Ile	Ser
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45	Ser	Ser 110		1 A	la T	hr <i>I</i>	Asn	Arg 1105	Pro	Trp	Asp	Phe	His 1110	Phe	Pro	Ser
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Glu Lys Leu Lys Leu Arg Gly Cys His Lys Leu Glu Glu Ile Pro

•

	1190	1195	1200
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	Glu Asn Leu Leu Gln Ser 85	Leu Leu Asp Asp Asp 90	val Leu Thr Ser Leu 95
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45	Ar	g Le	u Se 35		r Me	t Ph	e Se	r Th 40	r Il	e Gl	n Al	a Va	l Le 45	u Gl	u As	sp I	Ala	
50	Gl	n Gl 50		s Gl	n Le	u As	n As 55		s Pr	o Le	eu Gl	u As 60	ın Tr	p Le	u Gl	Ln J	· ·	
•	Le 65		n Al	a Al	a Th	r Ty 70		u Va	l As	ap As	sp II 75	e Le	eu As	p Gl	u T	yr :	go Lys	
55	Th	ır Ly	/s Al	la Th	ır Ar 85		e Se	er Gl	n Se	er G! 90	Lu Ty O	yr G	Ly Ai	g T	r H 9	is 5	Pro	

Lys Val Ile Pro Phe Arg His Lys Val Gly Lys Arg Met Asp Gln Val

Met Lys Leu Lys Ala Ile Ala Glu Glu Arg Lys Asn Phe His Leu

His Glu Lys Ile Val Glu Arg Gln Ala Val Arg Arg Glu Thr Gly Ser

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										UU							
		130					135					140					
5	Val 145	Leu	Thr	Glu		Gln 150	Val	Tyr	Gly	Arg	Asp 155	Lys	Glu	Lys	Asp	Glu 160	
	T10	₩.	Targ	Tle	T ₁ e11	Tle	Asn	Asn	Val	Ser	Asp	Ala	Gln	His	Leu	Ser	

Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asp Ala Gln His Leu Ser 165 170 175

Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala

Gln Met Val Phe Asn Asp Gln Arg Val Thr Glu His Phe His Ser Lys 195 200 205

20 Ile Trp Ile Cys Val Ser Glu Asp Phe Asp Glu Lys Arg Leu Ile Lys 210 215 220

Ala Ile Val Glu Ser Ile Glu Gly Arg Pro Leu Leu Gly Glu Met Asp 25 225 230 235 240

30

50

Leu Ala Pro Leu Gln Lys Lys Leu Gln Glu Leu Leu Asn Gly Lys Arg 245 250 255

Tyr Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Gln Lys Trp 260 270

35
Ala Asn Leu Arg Ala Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val
275
280
285

40 Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu 290 295 300

Gln Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu 45 305 310 315

Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Pro Asn Leu 325 330 335

Val Ala Ile Gly Lys Glu Ile Val Lys Lys Ser Gly Gly Val Pro Leu 340 345 350

55
Ala Ala Lys Thr Leu Gly Gly Ile Leu Cys Phe Lys Arg Glu Glu Arg
355
360
365

Ala Trp Glu His Val Arg Asp Ser Pro Ile Trp Asn Leu Pro Gln Asp 370 380

Glu Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His Gln Leu Pro 65 385 390 395 400

Leu Asp Leu Lys Gln Cys Phe Ala Tyr Cys Ala Val Phe Pro Lys Asp

84

. 405 410 415

Ala Lys Met Glu Lys Glu Lys Leu Ile Ser Leu Trp Met Ala His Gly 425 5 420 Phe Leu Leu Ser Lys Gly Asn Met Glu Leu Glu Asp Val Gly Asp Glu 10 Val Trp Lys Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val 15 Lys Asp Gly Lys Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu Ala Thr Ser Leu Phe Ser Ala Asn Thr Ser Ser Asn Ile Arg Glu 20 Ile Asn Lys His Ser Tyr Thr His Met Met Ser Ile Gly Phe Ala Glu 25 Val Val Phe Phe Tyr Thr Leu Pro Pro Leu Glu Lys Phe Ile Ser Leu 515 30 Arg Val Leu Asn Leu Gly Asp Ser Thr Phe Asn Lys Leu Pro Ser Ser 535 530 35 Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Tyr Gly Ser Gly 555 Met Arg Ser Leu Pro Lys Gln Leu Cys Lys Leu Gln Asn Leu Gln Thr 40 Leu Asp Leu Gln Tyr Cys Thr Lys Leu Cys Cys Leu Pro Lys Glu Thr 45 Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Ser Gln Ser 600 50 Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr 610 55 Leu Gly Gln Phe Val Val Gly Arg Lys Gly Tyr Gln Leu Gly Glu 625 Leu Gly Asn Leu Asn Leu Tyr Gly Ser Ile Lys Ile Ser His Leu Glu 60 Arg Val Lys Asn Asp Lys Asp Ala Lys Glu Ala Asn Leu Ser Ala Lys 665 65 660 Gly Asn Leu His Ser Leu Ser Met Ser Trp Asn Asn Phe Gly Pro His **85** .

	CRE	680 685	
	675		
5	Ile Tyr Glu Ser Glu Glu Val 690 695	l Lys Val Leu Glu Ala Leu Lys Pro His 700	
10	Ser Asn Leu Thr Ser Leu Lys 705 710	s Ile Tyr Gly Phe Arg Gly Ile His Leu 715 720	
10	Pro Glu Trp Met Asn His Ser 725	r Val Leu Lys Asn Ile Val Ser Ile Leu 730 735	
15	Ile Ser Asn Phe Arg Asn Cy 740	rs Ser Cys Leu Pro Pro Phe Gly Asp Leu 745 750	
20	Pro Cys Leu Glu Ser Leu Gl 755	Lu Leu His Trp Gly Ser Ala Asp Val Glu 760 - 765	
25	Tyr Val Glu Glu Val Asp II 770 77	le Asp Val His Ser Gly Phe Pro Thr Arg 75 780	
30	Ile Arg Phe Pro Ser Leu Ar 785 790 ·	rg Lys Leu Asp Ile Trp Asp Phe Gly Ser 795 800	:
•	Leu Lys Gly Leu Leu Lys Ly 805	ys Glu Gly Glu Glu Gln Phe Pro Val Leu 810 815	
35	Glu Glu Met Ile Ile His G 820	Elu Cys Pro Phe Leu Thr Leu Ser Ser Asn 825 830	
40	Leu Arg Ala Leu Thr Ser L 835	Leu Arg Ile Cys Tyr Asn Lys Val Ala Thr 840 845	
45	Ser Phe Pro Glu Glu Met F 850	Phe Lys Asn Leu Ala Asn Leu Lys Tyr Leu 855	
50	Thr Ile Ser Arg Cys Asn F 865 870	Asn Leu Lys Glu Leu Pro Thr Ser Leu Ala 875 880	
	885	Ser Leu Lys Ile Gln Leu Cys Cys Ala Leu 890 895	i.
55	Glu Ser Leu Pro Glu Glu (Gly Leu Glu Gly Leu Ser Ser Leu Thr Glu 905 910	1
60	Leu Phe Val Glu His Cys 915	Asn Met Leu Lys Cys Leu Pro Glu Gly Leu 920 925	ı
65		Thr Ser Leu Lys Ile Arg Gly Cys Pro Gl: 935	n
	Leu Ile Lys Arg Cys Glu	Lys Gly Ile Gly Glu Asp Trp His Lys Il	е

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· 86

945 950 955 960

Ser His Ile Pro Asn Val Asn Ile Tyr Ile 965 970

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